



TRIGEN

Unleashing the Power of Efficiency

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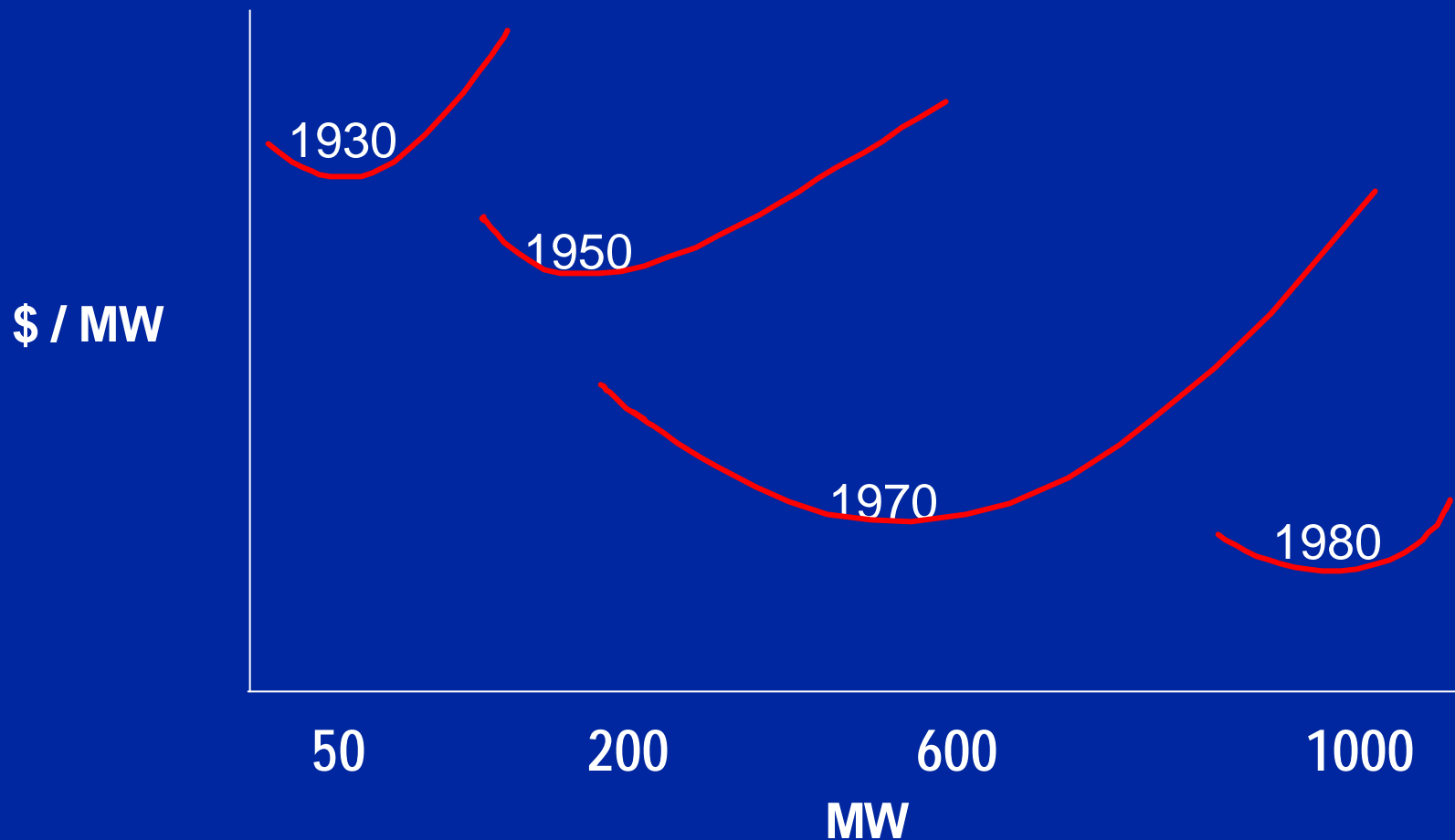
Today's Energy Conversion Efficiency Is Poor

- ? Both levels of efficiency are poor:**
 - ✍ Fuel to heat, cooling & power**
 - ✍ Heat, cooling & power to comfort**
- ? Capital stock is old, non-economic, largely preserved by regulations**
 - ✍ Call for stranded asset recovery is proof**
- ? Increase efficiency to maintain standard of living, reduce CO₂ & save money**

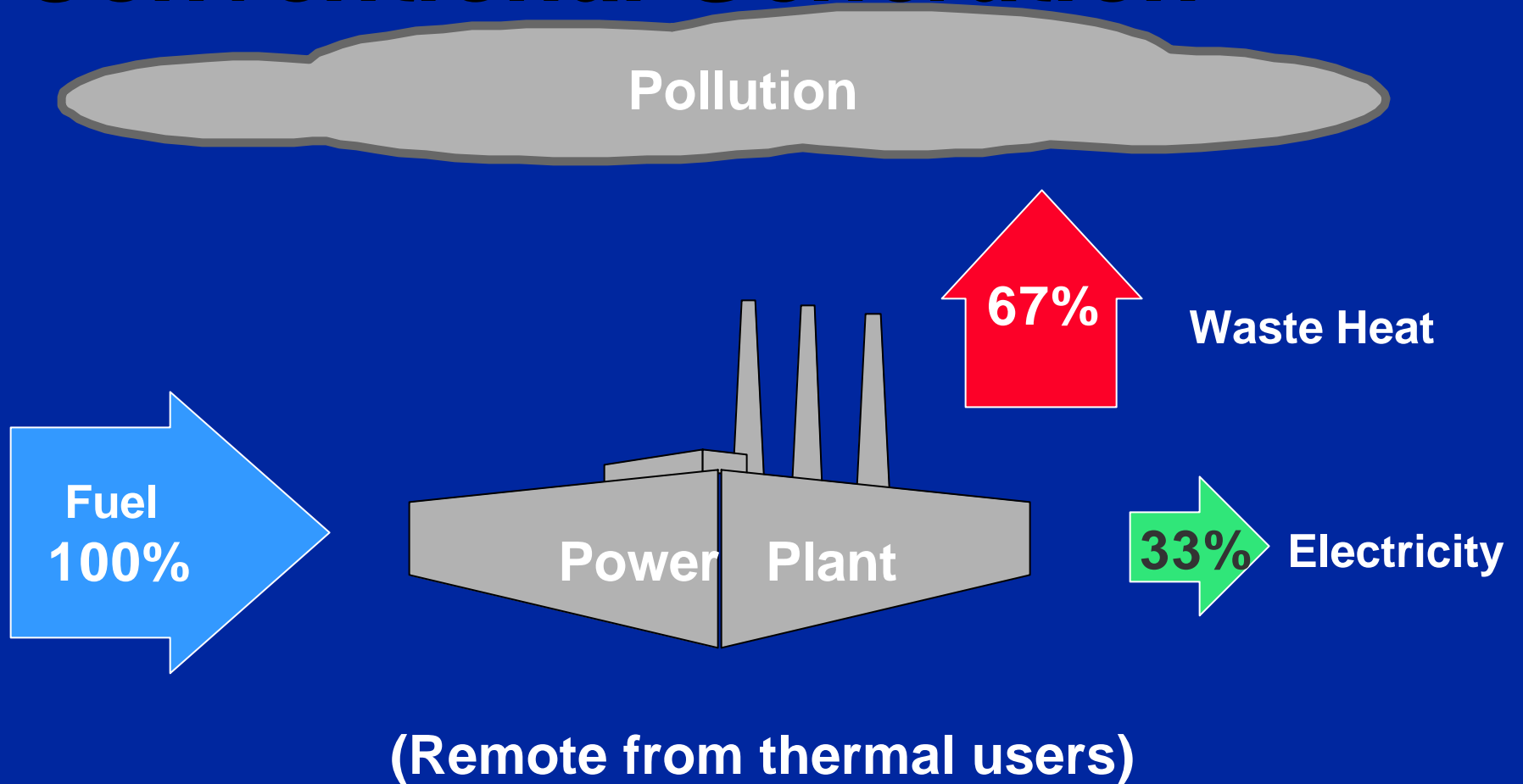
Optimal Plant Size

Per-MW Cost Curves (1930-80)

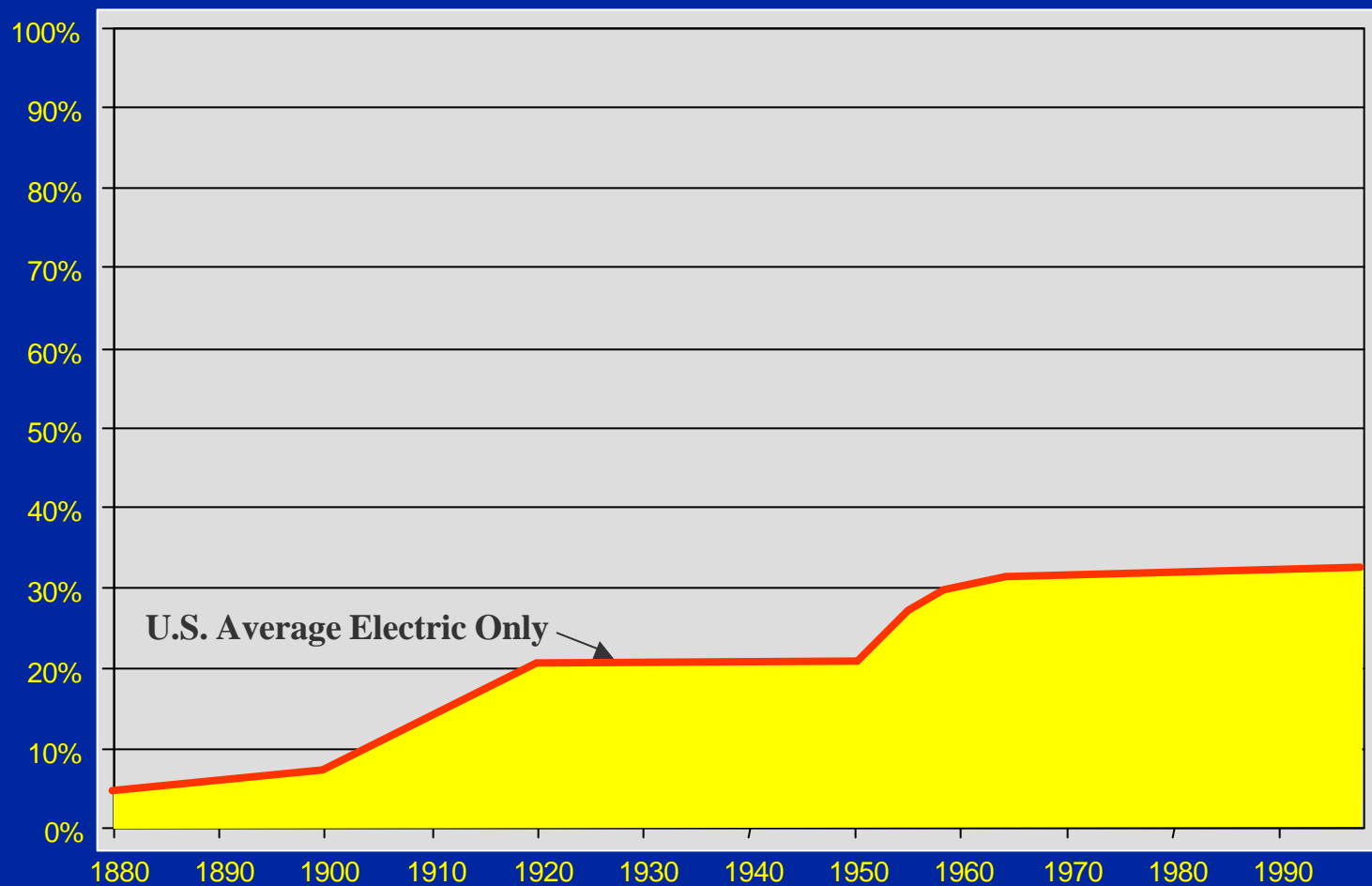
Thermal Plants



Conventional Generation

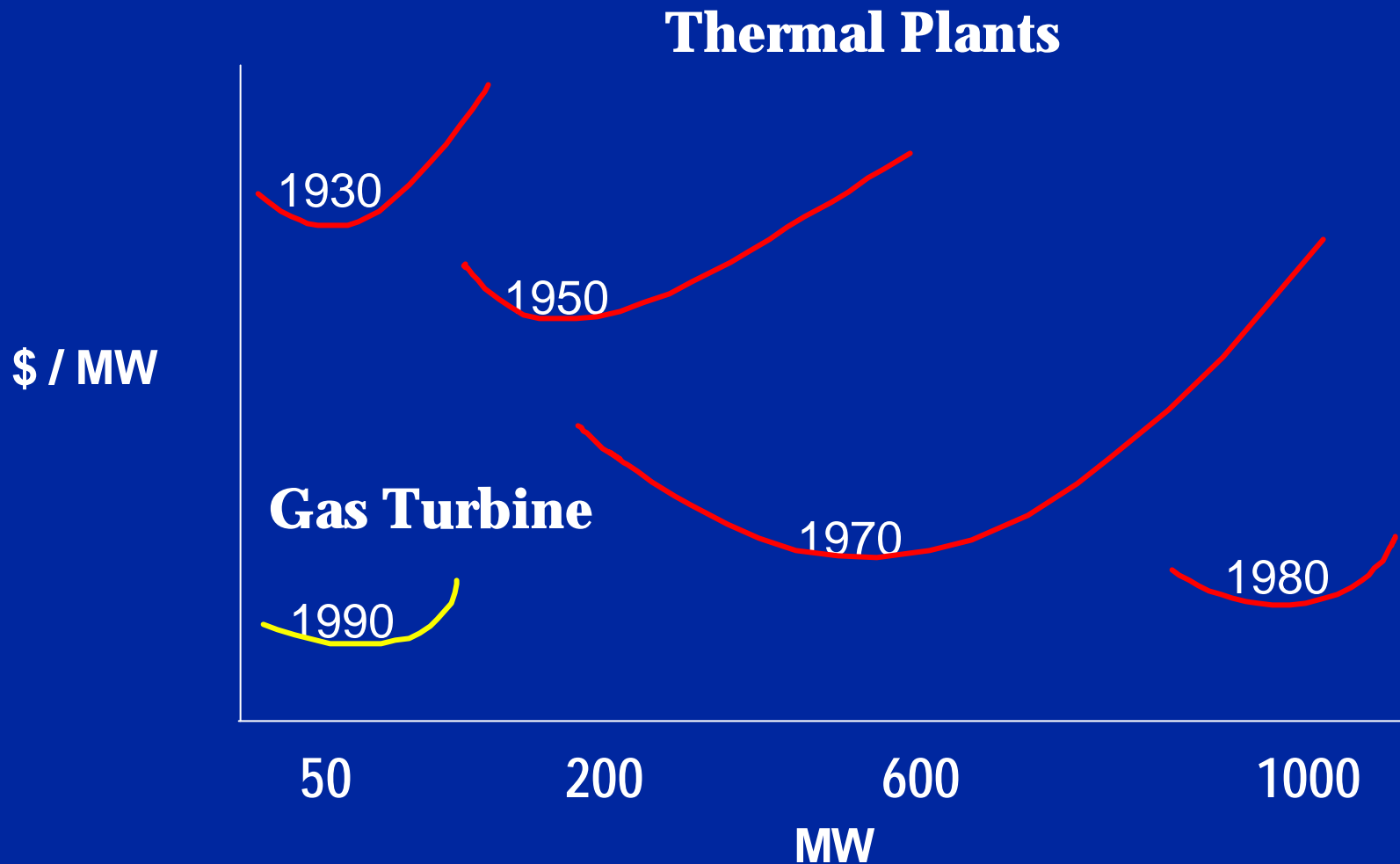


Energy Generation Efficiency Curve



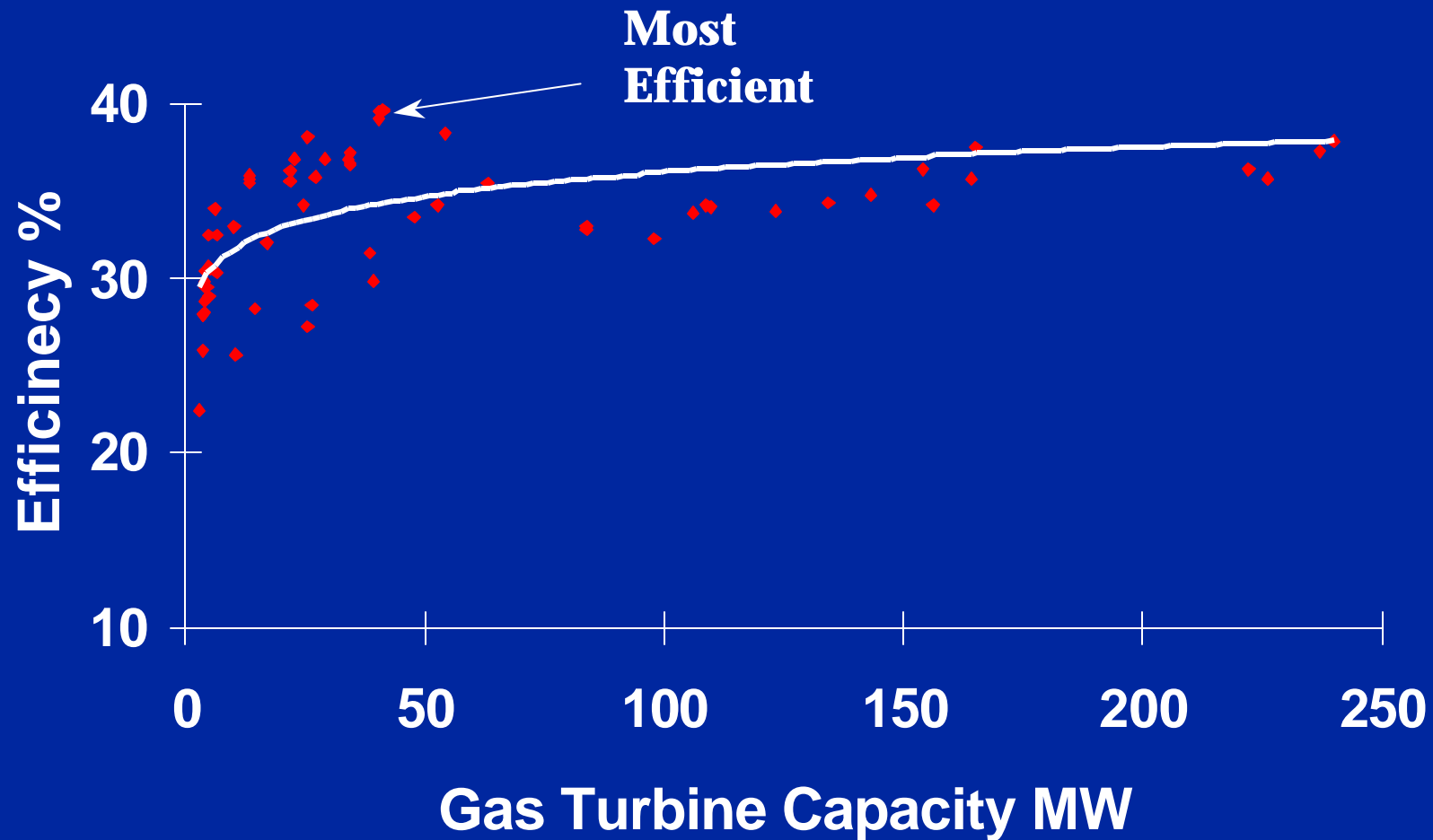
Optimal Plant Size

Per-MW Cost Curves (1930-90)

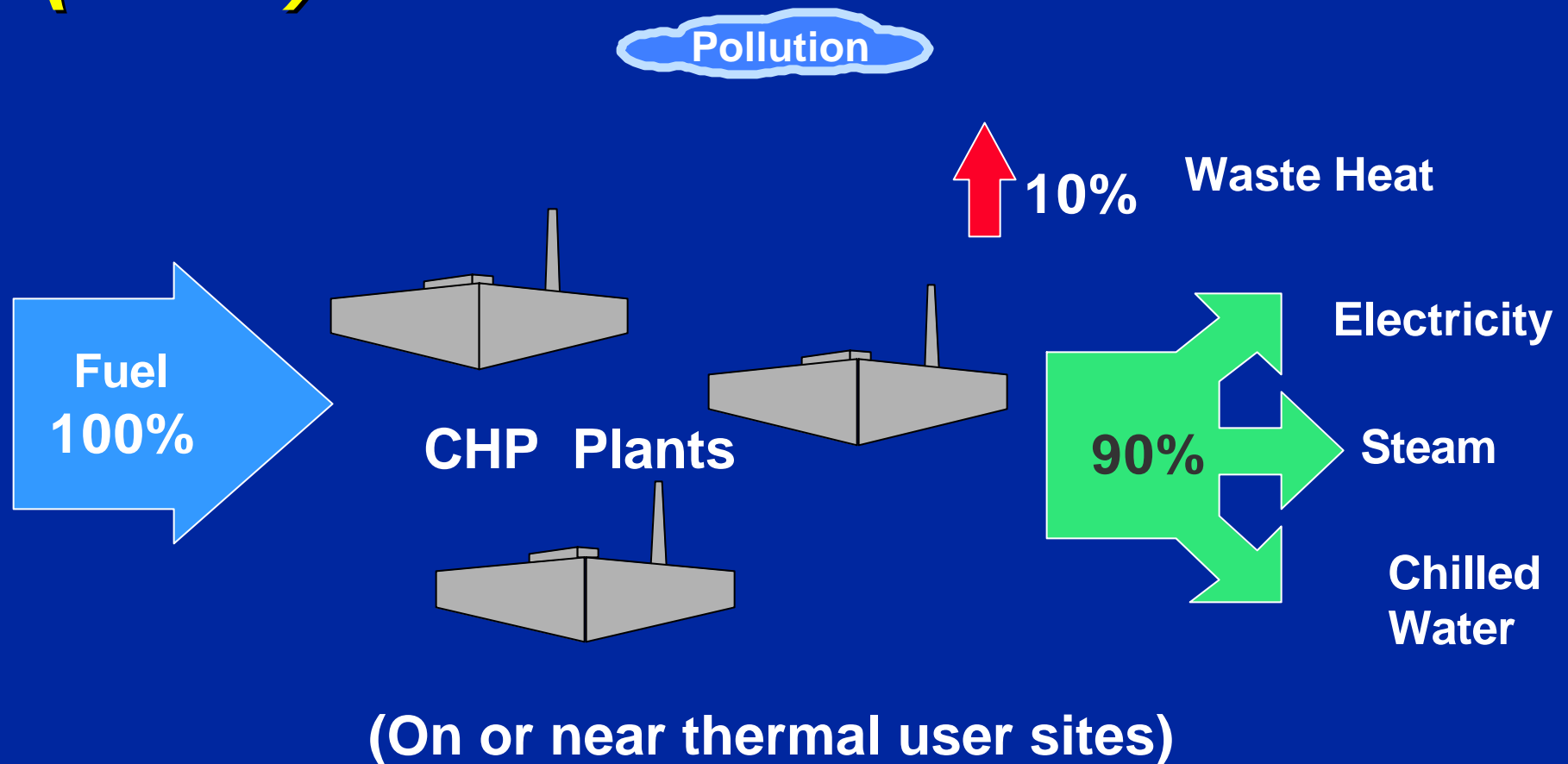


Gas Turbine Efficiency

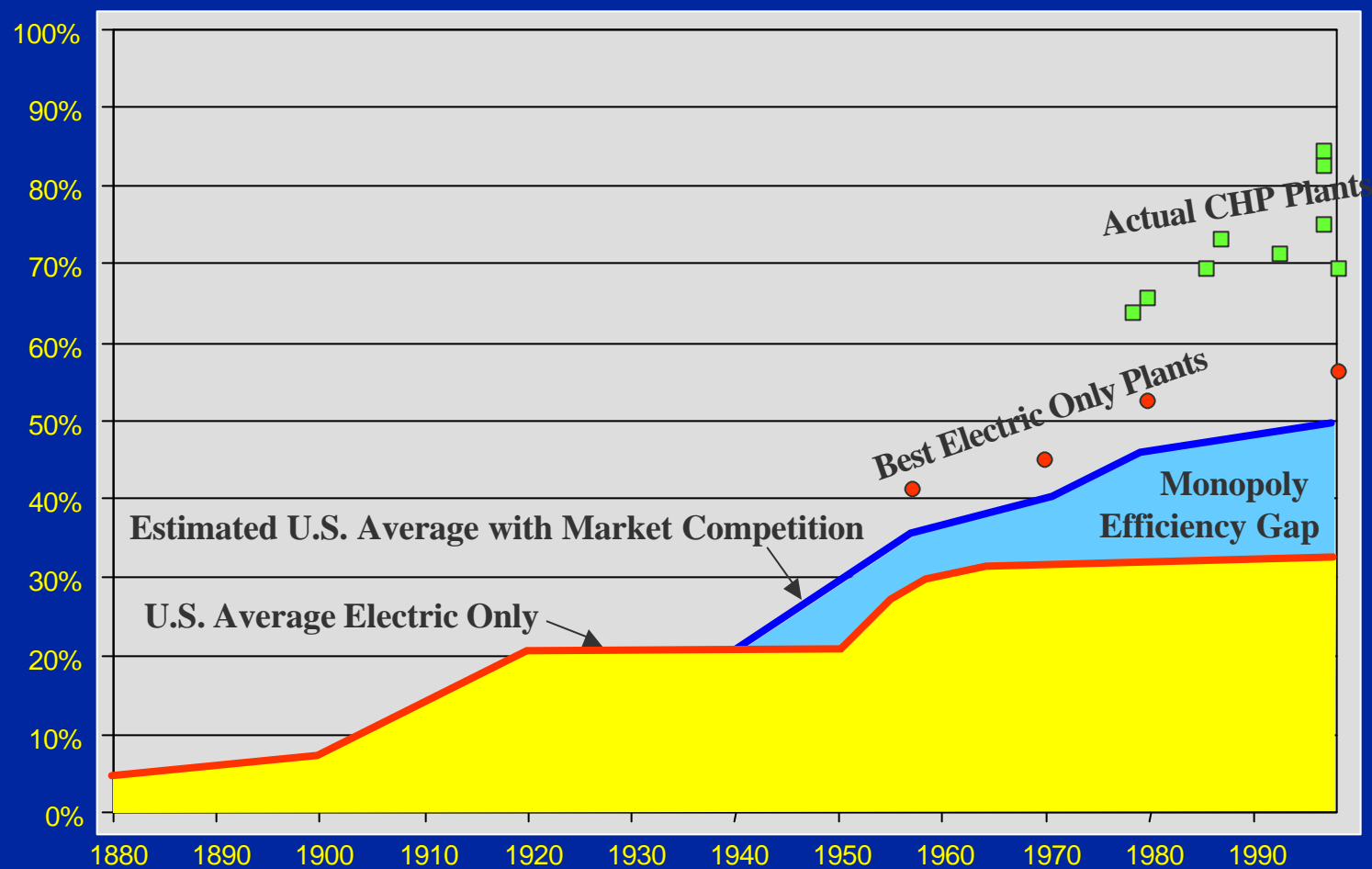
3-250 MW



Combined Heat and Power (CHP)

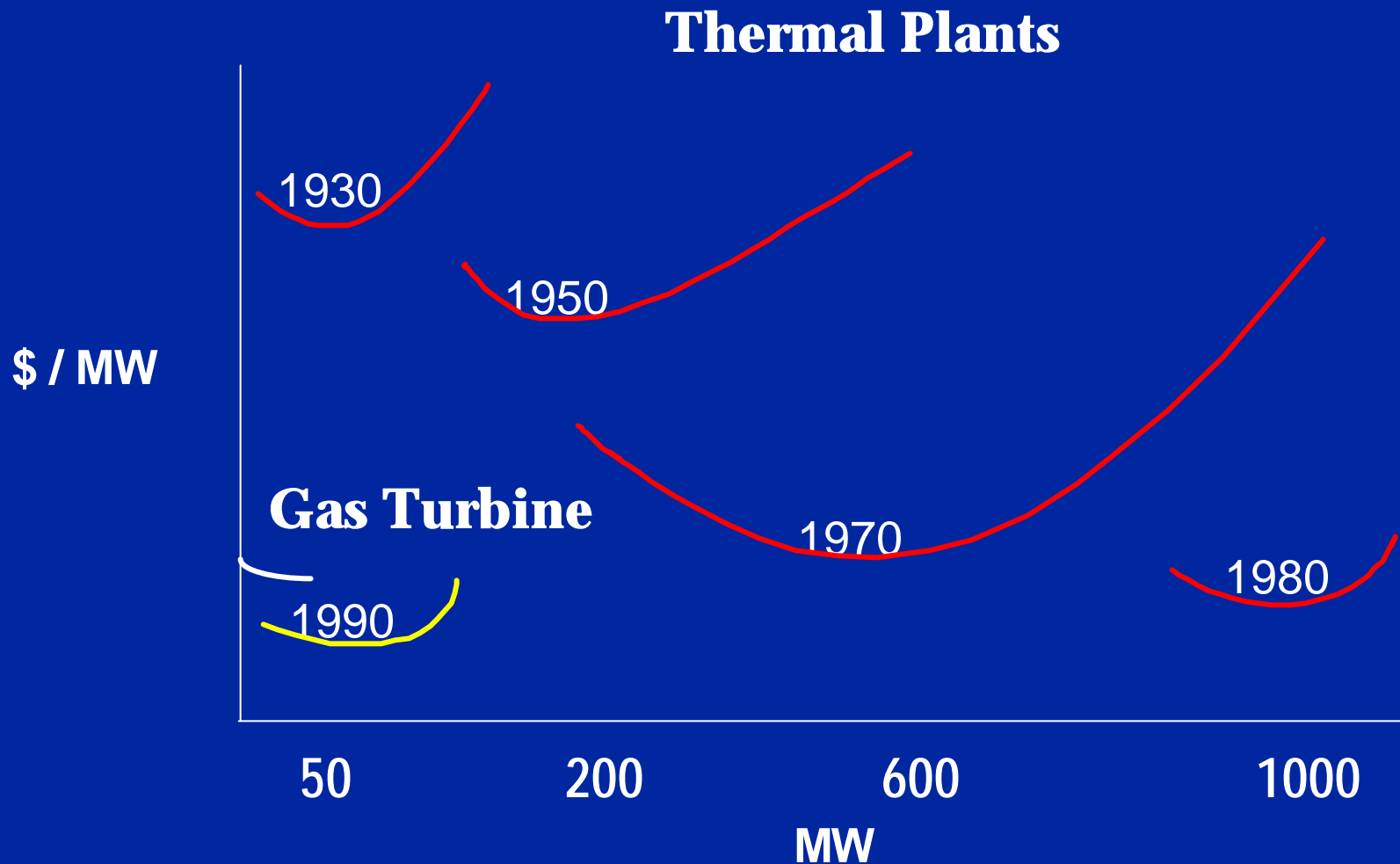


Energy Generation Efficiency Curve

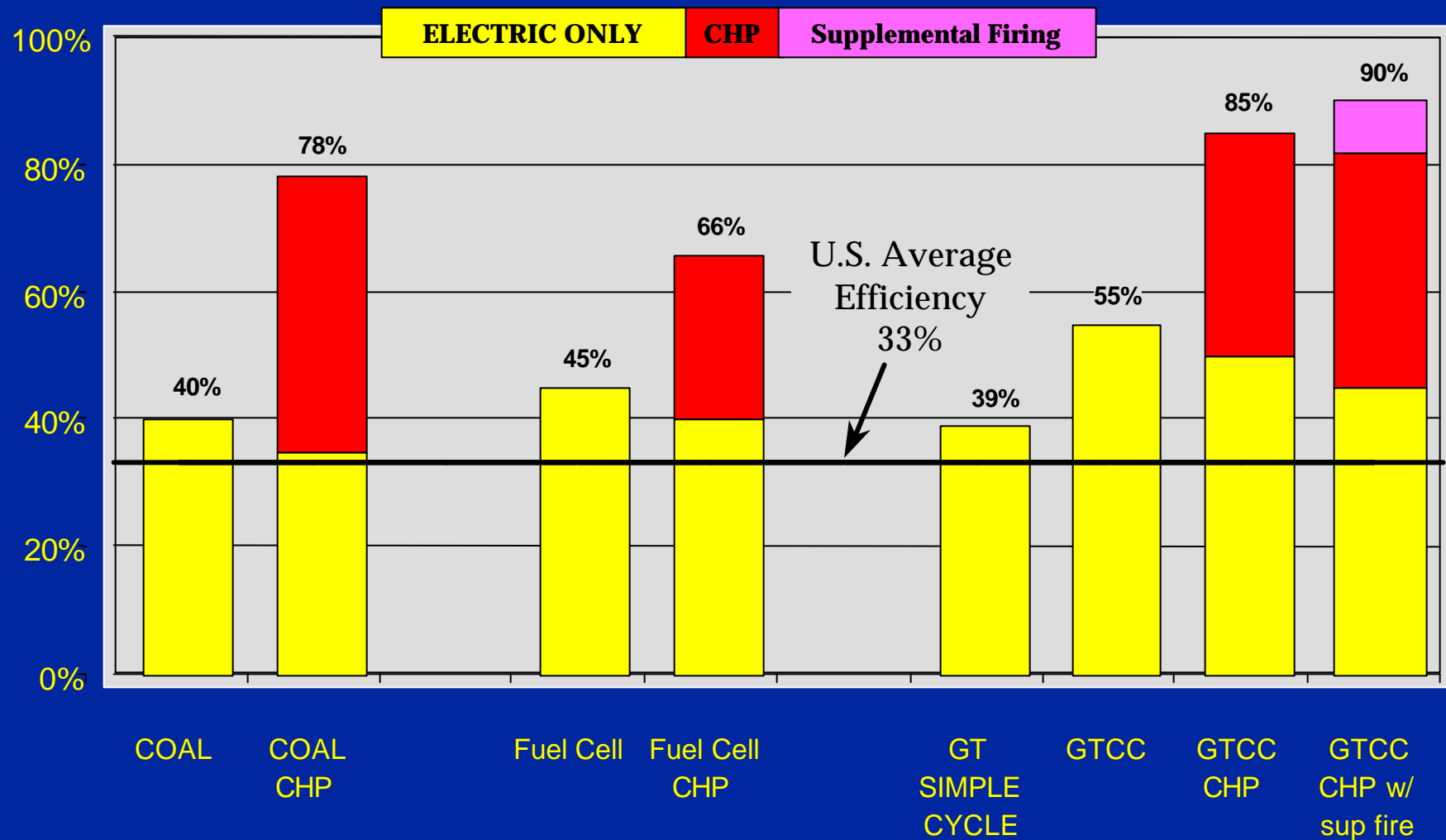


Optimal Plant Size

Per-MW Cost Curves (1930-90)



Generating Efficiencies of Various Technologies Today



Electric inefficiency due to outmoded regulatory approach

? 90 years monopoly regulation

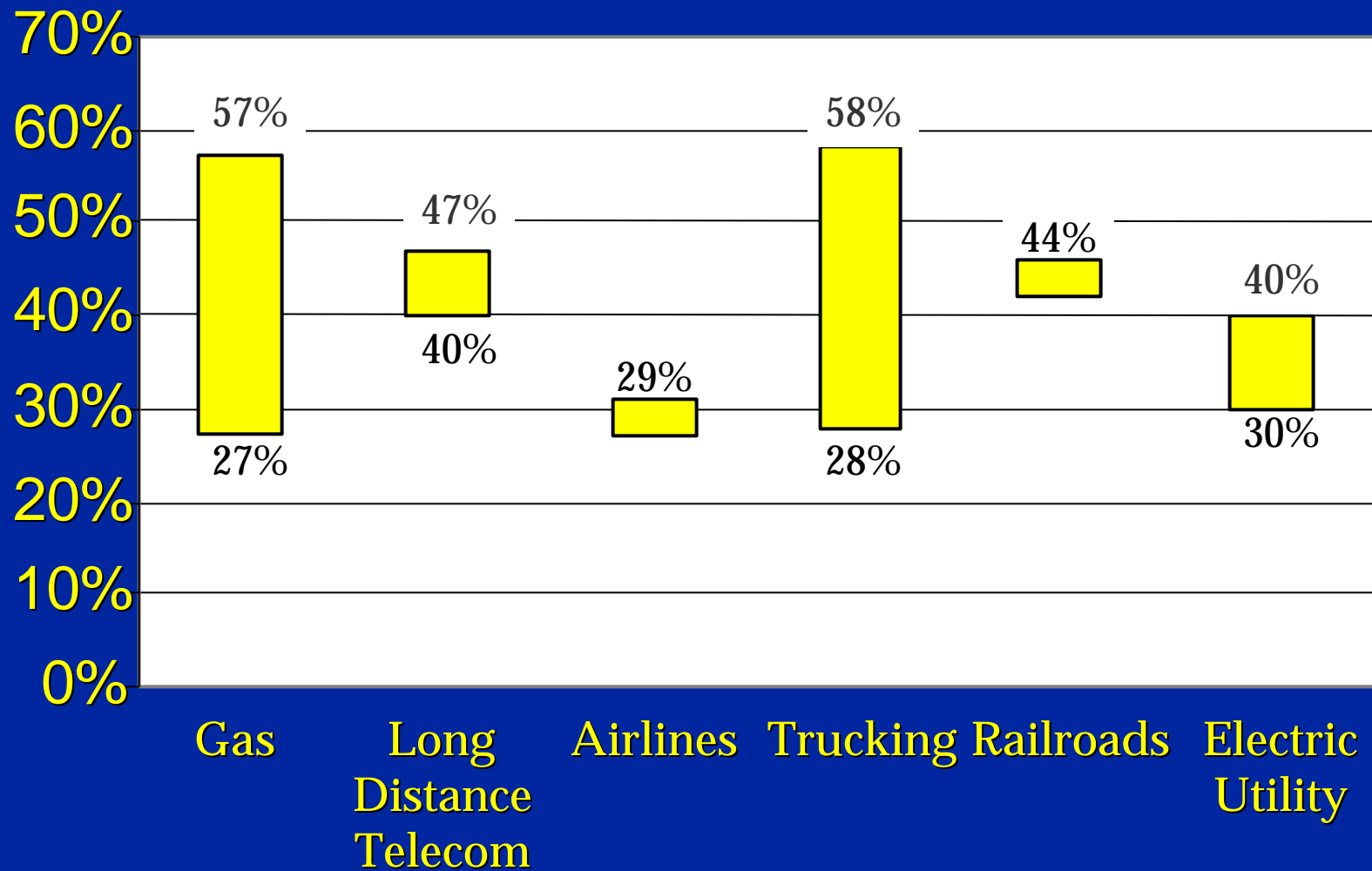
- ✧ No rewards for efficiency -- all pass through**
- ✧ State police power prevents competition**

? Central generation paradigm has led to:

- ✧ Government enacted barriers to efficiency**
- ✧ Customer inertia**
- ✧ Vendor focus on electric only technology**
- ✧ Aging capital stock of generation**

***Regulation and Policies need
to be modernized***

Real Cost Savings 10 Years after Restructuring



Examples of Barriers to Efficiency

- ? Competitor controls interconnect, backup power, and is monopsony**
 - ✦ PSCO requires 180 days to review interconnection drawings**
 - ✦ Confidential rate filings to preserve status quo**

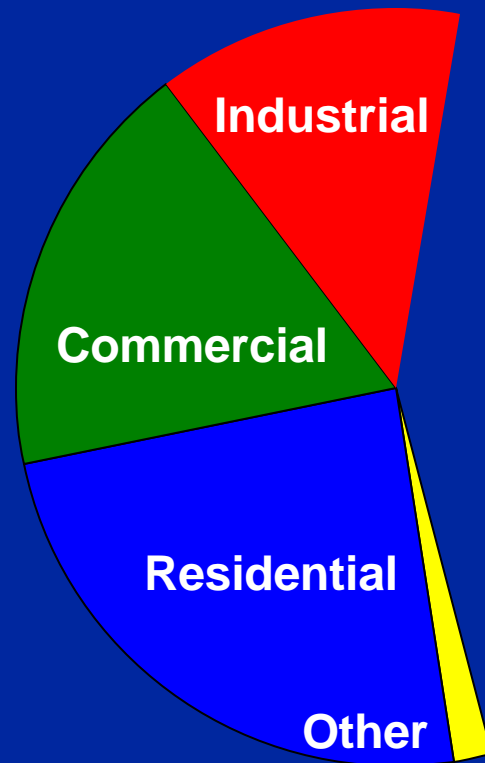
Environmental rules penalize efficiency

- ? Input versus performance standards**
- ? Old plants grandfathered**
- ? New Source Performance Standard approach fosters life extension of existing plants**
 - ✗ Old plants are inefficient and expensive**
 - ✗ Old plants are up to 100 times more polluting than new plants**

***What Are the Stakes
to the Economy?***

US Energy Market 1995

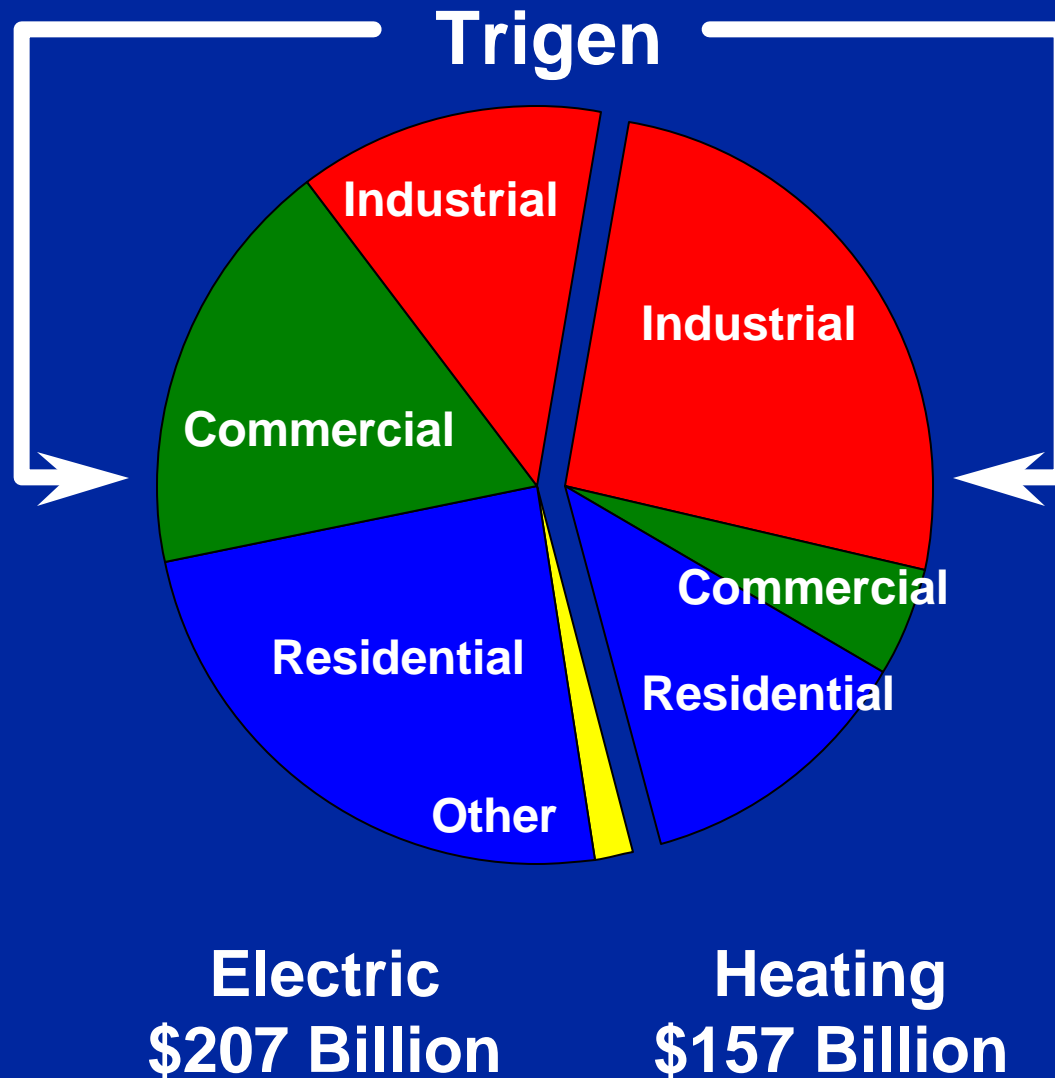
Annual Sales



Electric
\$207 Billion

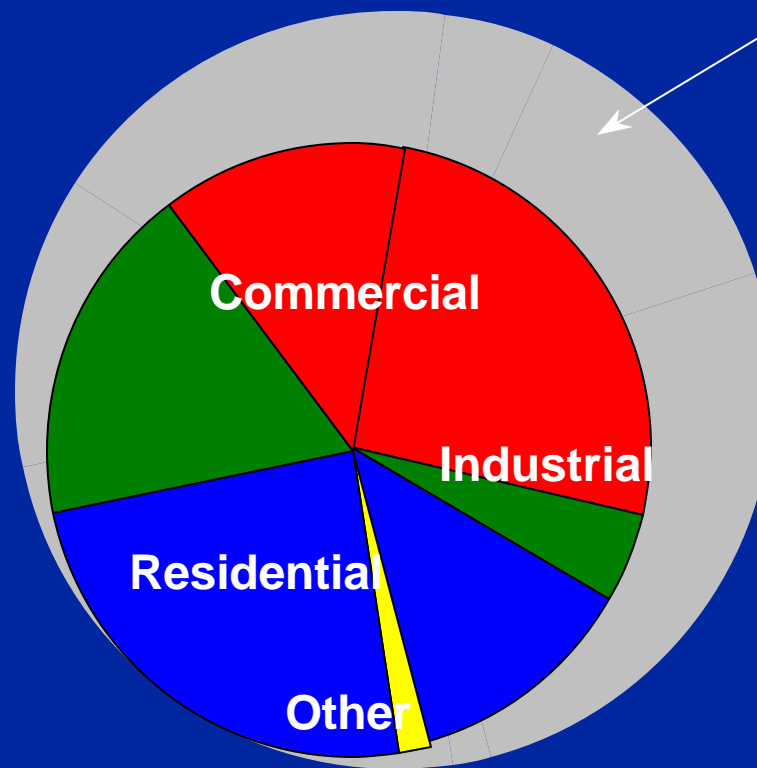
US Energy Market 1995

Annual Sales



US Energy Market

30% Expected Customer Savings



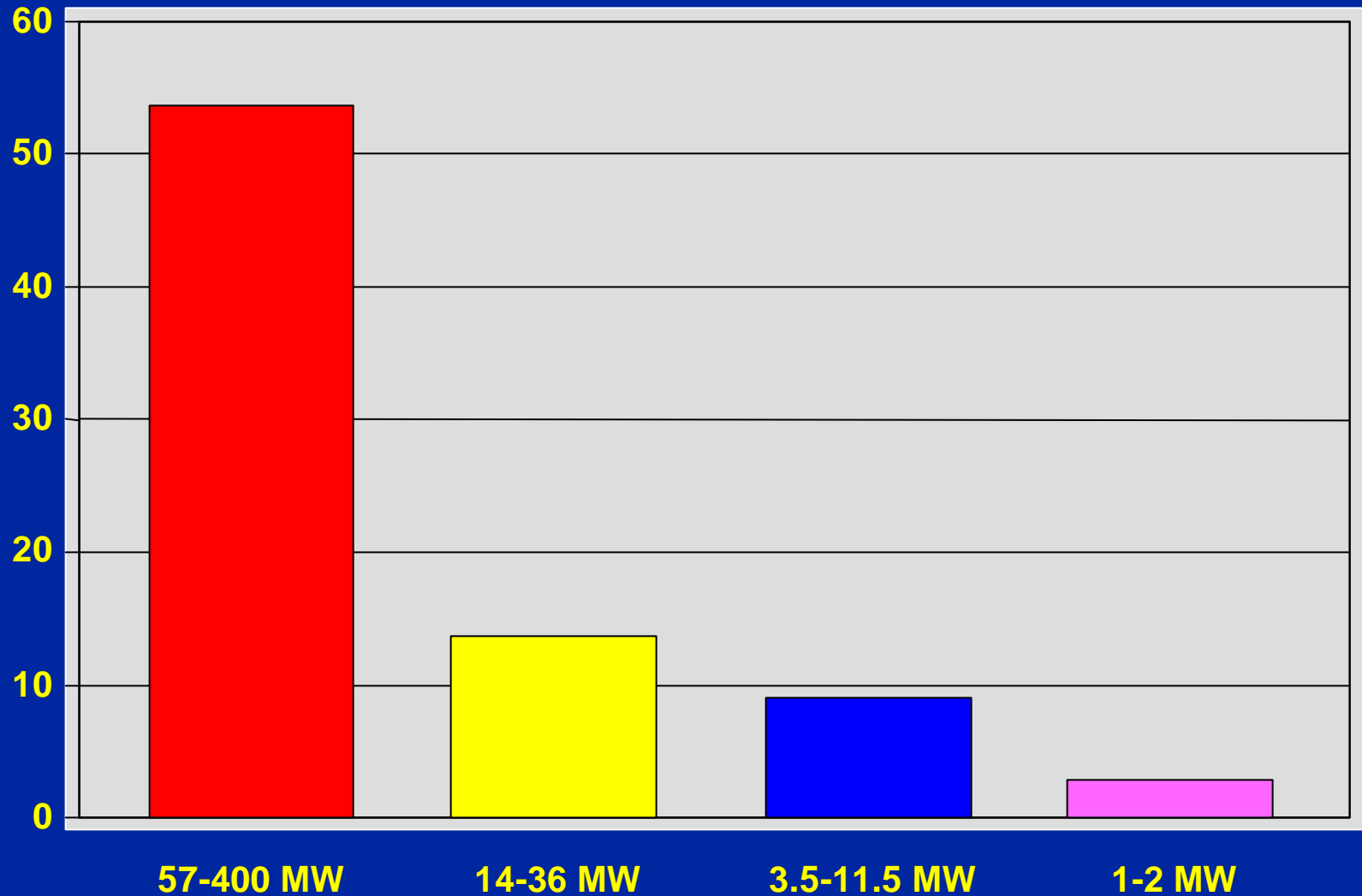
**Total Customer Savings
= 30% or \$109 Billion**

\$255

Total Energy Market = ~~\$364~~ Billion

U.S. Industrial CHP Potential (plant capacity in GW)

Gigawatts





TRIGEN

Standard Cogeneration Unit

- ? Standardized/
packaged**
- ? Factory built/
tested**
- ? 3,000 kw electric**
- ? 15 - 30,000 pph 425
psig steam**



On-Site Power Generation

- ? **Ewing Cogeneration Systems**
- ? **Innovative pressure reduction - 205 psig to 15 psig while generating electricity.**
- ? **Fits in mechanical room.**
- ? **Replaces pressure regulating valves.**
- ? **Save on electric costs.**

